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Kinetic Screens: Can the use of a Kinetic Screen be utilised as a medium that enables an audience to view projected content.

By Christopher Keech

A thesis submitted to the University of Huddersfield
in partial fulfillment of the requirements for the degree, Master of Arts (By Research)

May 2013

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Definitions

Key terms used in this thesis:

Projection- Either digital or non-digital sources producing an image visible through the application of direct light e.g. shadows.

Static Screen- A non-moving surface on which projected content is visible and able to be viewed on such as a wall or fixed fabric screen.

Kinetic Screen- A moving surface on which projected content is visible on such as falling sand.

Natural Resources- Water, sand and smoke, any form of liquid, object or substance that is naturally created.

Abstract

This thesis explores the application of what is best described as a kinetic projection screen and its use within a performance environment. It examines the kinetic screen's application within performances over centuries of development, from the use of the Watchman's Lamp (Heard, 2006), a device used to create shadows, to the modern day. How can this form of projection viewing be created and delivered within a performance? Is there initial evidence to indicate an alteration to the way in which an audience views the content on a kinetic screen, such as physical engagement, opposed to a static screen?

This thesis analyses theatrical theories and interviews with Arts practitioners and companies, who already have, or currently are applying kinetic projection viewing within their work. Research within this thesis has been collected through practical examination, illustrating the development, construction and demonstration of a number of kinetic projection screens.

Introduction

This Thesis reflects the research, experimentation, development and evaluation undertaken, over a ten-month period of practical based research. Our culture through the ages is ever developing in tandem with technology, both intertwining with the other. As with most things in the world nothing is truly new, but a development or adaption of an object from before, projection being no exception. When looking back at the early development in projection we come across the Watchman's Lamp being used to cast shadows on to various surfaces, and in time this was replaced by the Magic Lantern, due to its more diverse use through slides and lenses. The Magic Lantern played an influential role for the development of projections, as an important piece of equipment for the Gallant Showman (Heard, 2006:8) as they travelled to far off lands delivering performances.

During the early part of the twentieth century the use of projection was experimented with spiralling robes by Loïe Fuller (Dixon 2007:73), then later Frederick Kiesler who was the first person in documented history to project content onto a screen made of falling water in *R.U.R (Rossum's Universal Robots)* in 1922. Frederick Kiesler's work was later used in 1999 as inspiration for Paul Sermon's and Andrea Zapp's performance installation of *A Body of Water* (Sermon & Zapp, n.d.). The viewing of projected content on a screen that moves, can be created through a number of ways; this thesis will concentrate for the greater part on the use of water, smoke and sand. Therefore the question which this thesis will answer through practical examination and research is: 'Can the use of a Kinetic Screen within my work be utilised as a medium that enables the audience to view projected content?'

As new technological advances are made our theatre culture embraces it into the foundations of its development. Even within the last two decades, a change in the progression of technology and how it alters a person's daily life is apparent. If a person were brought up exposed to technological devices of a different nature, than another generation either younger or older, would this technology be perhaps viewed in an alternative way? When viewing technology implemented in a performance, an audience will view its use in a different way from one another because of what they are accustomed to seeing. This cultural

psychological alteration is discussed by Elliot Aronson:

[...] although discrimination and un-fairness are still very much a part of our society, George Woods's grandchildren, growing up in the 21st century, do not face exactly the same tribulations as George himself did. [...] In the latter part of the 20th century pride in being black began to emerge, along with an interest in, and enthusiasm about African American history and culture. Society is influencing George's grandchildren in a much different way than it influenced George.

(Aronson, 2007:4)

Aronson refers to a cultural transformation over a period of time. In regards to our perception of other human beings, this is an example that illustrates an understanding of how culture has already and will continue to evolve. Thus, there must be an understanding for a continuation of a cultural alteration, not only in the way that we perceive one another, but in other segments that shape our culture as a whole, such as that of the arts. The above quote from Aronson (2007:4) can be used as evidence to inform us of a difference in a person's cultural beliefs and opinions. This could be how you treat other people or perceive the world around you. Within our culture today, for a number of people the use of technology may be too much of an alteration to the delivery techniques to which they have become accustomed. For example, the use of Mursion (n.d.) within a performance may be viewed more suitable for a younger person, who had grown up within a culture surrounded by a continued development of technology, such as computers and television, rather than that of a person from an older generation, who may not have been exposed to such technology. It is through this understanding of the use of technology within the arts, such as the utilisation of projection, that within our culture a percentage of people will not have an understanding or means to connect with the performance, due to the continuation of a cultural alteration.

At this current time there are a number of companies around the world that specialise in the application of kinetic projection viewing within their work. Discussed in an extract by Gieseckam (2007) it is no surprise that currently there can be found what appears to be a greater use of applying projections in performances, due to the development of technology and the ease of acquiring it. This thesis explores the work of FogScreen, who project content on to a screen consisting of a cold mist and Aquabatics, a UK based company that hire out the use of a water screen for a range of events: this water screen displays projected footage

on to a falling water curtain. Fantasmic, at Disney's Hollywood Studios theme park USA, have integrated the use of viewing projections on a water mist created from a lake that surrounds the performance and seating area. Lastly, the H.O. Group who developed the installation *Perfect time* (2004), which used falling sand to allow the audience to view the projection, is analysed. These companies are discussed further in the thesis: interviews with these companies, as well as audience members who have been in contact with an operating kinetic screen will be drawn upon to stimulate the discussion, enabling a greater understanding in regards to how these kinetic screens are utilised and can operate around their audience to present content.

The purpose of this study was to develop and construct a number of kinetic screens; the analysis of companies using kinetic projection was important, as it fed into the development of the practical research. Developed at a later date, these kinetic screens would be used to demonstrate the viewing of projected footage. The examination and development process undertaken to create the kinetic screens for the demonstration will be explained, highlighting the key findings discovered along the way. The title given to the demonstration was *Reverie*, which in its broadest term means to dream. *Reverie* (2012) took place on the 11-12th of May at the University of Huddersfield, where the audience present was able to walk around the space, viewing the projected content on the kinetic screens.

In addition, engagement, although not of great importance, is an area which this thesis will explore. Though not to an extensive degree, it will begin to explore the concept of how the audience's engagement, both *visually* and *physically*, has the potential to alter from the use of a kinetic screen as opposed to a static one. During this part of the examination a small engagement test was carried out to record an average viewing time for both the static and kinetic screens. When complete, the results were compared to one another and this will be discussed towards the end of the thesis. In addition to the engagement test, sources by theorists such as Philip Auslander (1999) have been discussed; the aim of this is to lay the foundations for the advancement towards an understanding of the alteration of engagement, between a static and kinetic screen.

Projection Screen Viewing Through the Ages

Ancient Illusions

As discussed by CJS Thompson (1927) for many cultures in the past, such as Celtic Druids and ancient Egyptian Priest-magicians, belief and practice of magic was part of their way of life. It is known that the ancient Arabs used polished metals to reflect light, allowing them to control where the image became visible; this included the audience viewing images on '*Cloud or vapour*' (Thompson, 1927:89), much like the work of the company FogScreen presently in operation. This informs us that the ancient Arabs were viewing projected content onto what can be described as a kinetic screen thousands of years ago, telling us that the work by the company FogScreen may use the latest technology, but the form of viewing projected images on the mist is not as new and innovative as many may believe it to be.

Discussed in *Phantasmagoria* by Mervyn Heard (2006), a contraption was discovered on an excavation at the ancient Greek Temple of Ceres in Eleusis. This discovery provides evidence for a similar technique, in viewing projected images, as that used by a currently operating company Musion (n.d.). Whereas the technology has developed, the technique in the delivery of content has not. The reason for this link is down to the understanding that the temple, and perhaps others like it, used a system of reflective metals and maybe even glass to create the illusion that could appear and disappear at given will. The effect within the ancient Greek Temple would have been created through the arrangement of the reflective metals, by which a person's or object's reflection would bounce off a number of surfaces. This then gave the impression of appearing in front of the final surface as opposed to on it, providing the illusion to those watching the person or object being positioned in thin air. There is also reason to believe that to add more effect to this illusion, the area in which the viewers were situated moved in some way, thereby altering the viewer's position through either lowering or raising. The illusion would have been given a whole new layer of engagement, as this would have given the image the effect of ascending or descending.

Watchman's Lamp, Magic Lantern and Linnebach Projector

Over centuries the item known as Watchman's lamp, used for the application of casting images on to surfaces, did not undergo any massive alteration until the invention of the electric lamp. The Watchman's lamp worked by the use of light sources such as candles or oils, which were encased more often than not in a metal or wooden frame, with glass to protect the flame from extinguishing. The Watchman's lamp has been identified as an early piece of equipment that enabled the ability to project images, as discussed by Mervyn Heard (2006) and The Magic Lantern Society (n.d.). Within *Liber Instrumentorum* by Giovanni de Fontana (Heard, 2006: 26-27) we can find illustrations that show the use of a Watchman's lamp to cast the image of a large devil-like creature; these images could have been created through holes in the case of the Watchman's lamp or through painted glass.

Mervyn Heard (2006) speaks of a story of a person brought into a magic circle from which various substances, referred to as 'fragrant *and noxious smelling*', were added to a fire and in doing so images of devils and such appeared on the smoke. It is these images that are believed to have been created by the Watchman's lamp some time before the creation of the magic lantern. *Laterna Magic* as named by one of its first users, a Dane called Thomas Walgensten in the mid seventeenth century, translates to Magic Lantern, a piece of equipment known to people around the world to this day. Originally developed by the Dutch Scientist Christiaan Huygens the Magic Lantern began its journey of development not through anything of great importance, but in fact by way of a playful conjuring device by Thomas Walgenstein and a Jesuit Priest, Athanasius Kircher. As referred to by The Magic Lantern Society (n.d.), before long the knowledge of the Magic Lantern had travelled as far afield as London, and in 1669 optician John Reeves was re-producing the Lantern for sale. People like John Reeves who made the Lantern easily accessible were, in a manner of speaking, the ones responsible for the next stage of the Lantern's development through time.

Within old stories and tales such as *The Coppy* (Banim & Banim, n.d.) and the article *The Moving Pictures of Other Days* (Lawrence, 1923) the term Gallanty Showman is illustrated. Mervyn Heard (2006) states that during the eighteenth century we can find a number of

people around the globe in the possession of a magic lantern. These people are referred to as Gallant Showman, who travelled the world creating a performance in a variety of places including taverns, barns and homes. These performances would often be a cohesion of storytelling with magic. The Gallant Showman would use the lantern to display images of far off lands and tales, often scaring their audience in the delivery.

A date which stands out in the Magic Lantern's history is that of the 1780s, a period of time in which the Magic Lantern was used on a main stage by Paul de Philipsthal who previously went by the name Paul Philidor. He later developed what was to become a multimedia performance, *Phantasmagoria*, which premiered at the Lyceum Theatre in the Strand in 1801 (Phantasmagoria, 1801). The audience attending the performance would have been exposed to work of a new nature. Most certainly seated in darkness to allow for the best result, the audience would have seen ghosts and other demons appearing before them all around the space, created through the specific positioning of mirrors and lenses. (Morus, 2006). Out of thin air, all around the space through the implementation of back projection, devices that created the effect of image growth and shrinkage were used. Also projection onto solid objects/ walls was utilised, and it is quite possible that projection onto smoke was used. (Heard, 2006)

As Harrington (2012:1) discusses in the mid 19th century, the Duke of Meiningen (George II) exploited the use of the Magic Lantern for the use of projecting backdrops for the theatrical performance he produced and toured around German cities. Harrington (2012:1) then goes on to make the observation that there is a strong likelihood that the audience watching the performance would not have been able to easily tell apart the projected from the painted elements of the backdrop. Other reasons for the use of a Magic Lantern are made apparent by Harrington (2012:1). One which makes logical sense is that the use of a Magic Lantern to create a back drop for a live performance gave the production a wider choice of backgrounds, giving them control over what hand painted glass slides were used. Secondly, without projection a number of backdrops might be needed, whereas with the Magic Lantern only one would be needed to display a range of projections.

During the late 19th Century Linnebach developed the Linnebach Lantern, which was also widely known as the Linnebach Projector. This device allowed for images and shadows to be projected onto the stage. We can find reference in *Stage Lighting Design* (Pilbrow, 1997:461) for the application of the Linnebach Projector. The Projector had the ability to show not only static, but also moving images and patterns such as fire, leaves and rippling water. This effect was achieved through the use of a number of rotating gobos, and when creating more complex effects alternate rotating gobos were used.

Twentieth Century

As Dixon (2007:73) discusses in *Digital Performance*, in Berlin 1911 we find a serpentine dancer by the name of Loïe Fuller. Loïe Fuller specialised in experimenting with movement in conjunction with lighting and the spiralling of her robes. In 1911 Loïe Fuller demonstrated to an audience, the viewing of projected film on robes worn by her. Had the robes which the images appeared on been of a static nature, the viewing would not have been any different than watching the footage on a wall or another form of static screen. The robes which the film was being projected onto, however, moved in conjunction with that of the movement of Loïe Fuller, allowing them to be recognised not as a static screen but kinetic.

Dixon (2007:75-76) gives detail of Frederick Kiesler, a multimedia designer who is known as the first person to combine projected media with water as the means to view the content. In 1922 the Berlin performance of Karel Capek's *R.U.R* (Rossum's Universal Robots) implemented a range of different film orientated effects, the main one of which was the use of rear projection. After a couple of days of the show opening to the public the performance was brought to the attention of the local authorities, who raised concern that the projection system could potentially be a fire hazard. As a consequence Kiesler created a water screen by installing a water tank above where the previous screen had been. Thus, from that point the footage was viewed on the wall of water as it fell to the ground. As a result Kiesler became the first documented person to use water in this way on stage. Paul Sermon and Andrea Zapp later visited the work of Frederick Kiesler in 1999, as inspiration for their installation of *A*

Body of Water (Sermon & Zapp, n.d.); this particular use of water screen viewing will be discussed later in the thesis. It is unlikely that the water screen used by Frederick Kiesler, would have been developed in the same way as that of the one used by Paul Sermon's and Andrea Zapp's. As there was such a long period of time between the two, the screens would have been altered through the development of technology and current theatre practice; this is supported by Baugh (2005) where he states:

During the last decades of the twentieth century, new technologies have had quite far-reaching effects upon the development of theatrical practice and performance.

(Baugh 2005:203)

Baugh is referring to theatrical practice and performance's ever evolving state; he then goes on to discuss the point that in terms of stage lighting we can find a steady rate of development over the twentieth century, unlike sound that did not have a significant effect in theatre until after the Second World War. Baugh states that through this continuing development of technology and its implementation in performance, there is a considerable effect on what is recognised as traditional theatre. This ever developing alteration of technology within theatre is something that has been around for centuries; it is a product of our cultural development and is a factor that will continue to be seen in years to come. It can be considered that the reason for this continuing development is down to the ever developing technology in the theatre culture in which we live. As discussed by Andrew Sofer:

Every significant dramaturgy summons a technology adequate to it: the deus ex machina of the Greeks, the trap door to Hell of the Elizabethan playhouse, the groove-and-shutter scenery of the Restoration, the nineteenth-century black box.

(Sofer, 2005)

Sofer makes reference to the use of technology present during any given time period having an influence on the way in which theatre culture is altered. Over time technology has developed, resulting in an alteration in the way in which an audience might perceive a performance. The relationship between audience and technology is equal, in that they rely upon one another; the audience views the affect of technology and the technology has no purpose if its affect is not viewed, thus, should not be perceived as separate from one another, but as a united pair.

Present Day

As discussed earlier in the section titled *Ancient Illusions* there can be found a gradual alteration in the way that light has been used to create an image, whether it has been a subject of reflection as used in the Greek Temple of Ceres or from a direct light source such as the light passing through the painted glass slides on a Magic Lantern. As known, the Gallanty Showman were travelling, creating performances using the Magic Lanterns centuries ago, allowing them to display images of locations for their audience to be immersed in, or displaying ghosts that appeared and moved around the space in the performance *Phantasmagoria*. These two examples have no extraordinary alterations in the manner that the technique is delivered in, all that time ago or in theatre today, the only adaption being that of time and development of the technology used.

Over time there has not been a sudden switch from theatre without projection to performances with; it is simply down to how it is perceived. What is meant by this is that projection in performance has been ongoing for a long time and that over time alterations of the use for projections have become more apparent because of our growing knowledge of the technology as the viewer. Also, as time has passed we are seeing a greater use for projection in theatre and not simply a new way of presenting work; this is down to the fact that the equipment needed is easier to get hold of. Two examples of such a program include VPT (2010) & Resolume (n.d.), an easily accessible inexpensive program that gives you the means to manipulate projected footage for live mixing in a performance. Whereas the application of projected content has been in use within theatre for a long time, Dixon (2007:73) acknowledges the work of Loïe Fuller, as a significant figure in the historical origin of video in live performance. Although video as we know it today was not used, as discussed by Sperling (2007:46) Loïe Fuller had imagery from magic lanterns projected onto her robes, thereby delivering a cinematic performance to a live audience. As Greg Gieseckam (2007) discusses, time has moved on and in doing so is creating an easier accessibility for technology at more affordable prices:

It is true that video has only become common in theatre in the past 25 years, as diminishing costs, smaller, more flexible equipment, and increasingly sophisticated editing and projection have made its use more attractive.

(Gieseckam 2007:2)

The result of the above is the growth in the number of performances utilising projection in one form or another. Currently producing work with the use of projection are companies such as Jasmin Vardimon (n.d.), Forced Entertainment (2012) and DV8 (n.d.), all of which have delivered a number of performances incorporating static projection. In 2012, in the West End a number of performances including *War Horse* (2012), where a screen was positioned above, stretching across the back of the stage, and *Ghost* (2012) used a number of LED screens positioned around the space. Though with *Ghost* LED screens were used, as opposed to a projected content, it was viewed on a static screen. Whereas both these performances do not display footage on kinetic screens; this represents a wider application for projection in contemporary performance. When reflecting back a number of years to performances such as *The Lion King* (BBC, 1999) or *Wicked* (Smith, 2006), the application of projection was not an integral element of the performance, if utilised at all. In terms of Kinetic projection there are a number of companies currently operating around the world, which will be discussed in the next section of this thesis. Though these forms of projection viewing on a Kinetic screen are not used in the West End, they are being used extensively but within a smaller performance environment.

Having been influenced by personal experience and exposure to a range of different performance environments and settings, it could be suggested that the scale of performance space, and the audience's ability to engage with the projected content, is what determines the functionality for the application of kinetic projection viewing or not. As I stated in the Introduction to this thesis, there is an expectation and understanding of how an audience engages with the viewing of projections, as well as the physical interaction that occurs between the audience and screen. In most instances the audiences and a screen are in a sense segregated from one another; the screen is watched by the audience and no other interaction is present:

One of the main conventional explanations advanced for the continued appeal of live performance is that it offers a fuller sensory experience than mediatized performances. Whereas mediatized representations appeal primarily to the visual and auditory senses, live performances engage all the senses, including the olfactory, tactile, somatic, and kinesthetic.

(Auslander, 1999:55)

Auslander refers to an immersed experience being present during a live performance, compared to that of a mediatized one. Having not been given any context as to the setting in which these two performances, live and mediatized, are delivered in, the first to come to mind would be that of your traditional theatre. In traditional theatre we can find a stage where the performance is delivered, and the seating is where the audience perceive it. In a live performance there is the potential for the performer to interact with the audience. When using a recorded piece of footage for a mediatized performance, however, this personal interaction is not achievable to the same degree due to the content being predetermined; there is no way to alter the content. Auslander then goes on to say that he disagrees with the above statement:

It certainly can be the case that live performance engages the senses differently than mediatized representations, but a difference in kind is not the same thing as a difference in magnitude of sensory experience.

(Auslander 1999:55)

As stated by Auslander; neither a mediatized performance nor live performance has a variation in sensory experience. It is my belief, however, an understanding should be taken in to account for the location in which the performance is taking place, as this is a vital factor for consideration. Should a mediatized or live performance be delivered in an environment, where the audience were seated, or alternatively an installation piece where the audience is immersed in the performance? As defined by Gareth White, in an article on Immersive Theatre:

[. . .] the event and the gesture of surrendering oneself to a clinical/experimental/sacrificial process, but it also makes use of a physical interior, engages the whole body of the spectator participant, and creates an ambiguous situation.

(White, 2012:223)

If the audience were situated in an immersed space as described by Gareth White, with the ability to touch the performers and other objects in the environment as they wished, it becomes clear that the argument previously discussed by Auslander (1999), is a statement that could be disagreed with; through touching people and objects we are able to create a

level of engagement through a means of physical interaction, which is simply not attainable with projection onto a static screen. Through the means of physical engagement with a kinetic screen, such as sand, an audience has the ability to alter the way in which the image is perceived, whereas if a kinetic screen is used we are able to create an all-round enhanced engagement for the audience's senses *visually* and *physically*.

Musion

Musion is the world's leading company of, what is best referred to as, a holographic projection representation (Musion, n.d.). The reason for referring to it as a holographic representation as opposed to a 3D hologram is purely down to the fact that it is not just light creating an image in thin air, as seen in fiction films such as Star Wars, but because a screen is needed for the Musion holographic projection. The Musion screen is not a kinetic screen. The surface on which the projected content appears is static and more importantly the screen is invisible to the audience, or the holographic effect would not be achievable. Content can appear as if out of thin air with the ability of displaying anywhere on the screen within the space it inhabits, with a 3D appearance. Unlike with kinetic screens that use sand, water and fog, the audience has no way of physically interacting with the content, due to the fact that if the audience were up close to the screen the illusion would be broken. Secondly, unlike kinetic screens discussed later, the audience viewing the Musion screen would be unable to touch the image; the physical engagement would be, in a manner of speaking, no different than that of touching any projected footage on a static screen, due to the transparent plastic being used by Musion.

Musion's technique has developed this projection viewing platform through the use and application of current technology to create their holographic illusion. It is, however, a good example of what was discussed in the earlier section where nothing is truly new, but an adaption of a past technique; for example, the electric stage light is the development of gas stage lighting. Similarities are present between Musion, ancient Greek Temple and ancient Arabs, as discussed earlier in this section titled *Ancient Illusions*, it is known that reflecting images off polished metals was employed. This technique, similar to that of Musion, but with

the technology of the respected time periods, where musion use electrically generated images and other materials to reflect the content to allow viewing. A dominant example of the development of the ancient Greeks' and Arabs' techniques can be found in the mid nineteenth century through the work of John Henry Pepper, who is credited for this technique on the stage. From the many performances created one example in particular that would have been memorable and exciting for the audience of that time period, took place in 1862 with an adaptation of Charles Dickens's *Christmas tale* (Groth, 2007:1). The audience of the time would not have been familiar with this kind of effect, as ghosts appeared from thin air before them, nevertheless, this effect would have been created in a similar manner by the use of reflecting light onto a transparent screen, as can be found approximately 150 years in the future with the work of Musion.

The Musion projection system has undeniably had a massive impact within the AV (Audio – Visual) industry, due to the growth of its use, most probably because of its ability to impress audiences watching it; a clear growth can be found over the years in the interest for its utilisation within a range of settings: performance, advertising and presentations, etc. As discussed earlier, Mr Allen was clear about the fact that the Aquabatics water screen's popularity was primarily down to the novelty appeal effect it had on its audience, rather than a practical function. It is safe to say that the quality of image on the Musion screens do not hinder the projected content in any way, there must also be consideration for the novelty appeal of the screen. If an audience is exposed to an image, that has a 3D appeal, opposed to a 2D image, then it is highly probable that the 3D image will have a longer lasting influencing effect on the audience viewing it.

Some of Musion's past customers include Virgin. In 2005 Sir Richard Branson was streamed live to a conference where he engaged with the audience present both visually and audibly. In 2012 the BBC used footage of the Queen from over her 60 years of being on the throne, to present the clothing she had worn over the years. One of earliest uses of the Musion screen within a large scale, was that of the Gorillaz and Madonna's performance at the 2006 Grammy Awards, during which the audience were not aware they were in fact viewing a

virtual version of Madonna until further into the performance. (Musion Systems, 2010)

Current Practice with Kinetic Screens

Smoke Projection Viewing

Around the world we can find projection onto smoke being created by a number of sources, such as IO2 Technology (n.d.), who create table top and upright smoke projection screens. This particular upright screen has an advantage over other screens that use smoke/ water vapour, as it is usually installed against a wall as opposed to overhead or on a floor. Doing so, IO2 Technology have been able to project a person in full, without the issue of the image quality decreasing, as can be found with the FogScreen as the smoke disperses (whereas the fog screen can achieve a greater width, the IO2 Technology unit can achieve a more evenly spread screen in height). Recently in Japan, research was carried out at Osaka University into the application of 3D water vapour projection viewing through the application of three projectors, displaying a slightly altered image from a different angle, the viewer was able to perceive a 3D image. Further research is underway to create a full 360-degree, 3D image, with the plan to potentially use the 3D smoke screens in healthcare and entertainment. (Diginfonews, 2011)

Founded in 2003 FogScreens have been installed throughout the world in over 50 countries, either as part of a touring show, installation or a permanently installed piece of equipment. There are three types of units with slightly different variations from one another; as to which one of the three models an event may use, is dependent on the specification for its intended use. For example, the FogScreen Pro has the ability to be linked to a number of additional units of the same model; by doing this the fog screen surface is increased, allowing for a much wider area to be projected on to, should it be required to do so. (FogScreen, n.d.)

The actual 'fog' that FogScreen use to project onto, is unlike the commonly used smoke in theatres or other arts venues, but rather a mist much like you would find with a cold humidifier. Working very much in the same way as the Pond Fogger, the FogScreen

company have developed a way of using ultrasound to convert water into cold mist, but on a much larger scale. This cooled mist is then channeled through what is referred to as the honeycomb, before exiting the unit equally distributed throughout the length of the FogScreen. The mist is then channeled down between two curtains of air to create the smoke wall. (Reynolds, 2007)

FogScreens have been used within a diverse range of events and venues such as nightclubs, museums, theme parks and shopping centres. For example; BowlCircus (n.d.) have a FogScreen installed at their entrance, on which various advertisements and branding is visible. The customers have to pass through the fog to gain access to a variety of activities, and in doing so a physical interaction is formed creating an additional platform of engagement, allowing for a higher level of impact on the audience, the hope of which will be to attract an audience towards the particular product advertised on the smoke. Elite Models (n.d.) incorporated a FogScreen into the design and operation of a catwalk- modelling event where the FogScreen doubled up as both the entrance and exit to the stage, allowing the models to pass through the projected content seen on stage. Through using FogScreen, projections visible on stage were continuous, taking away the void that is often present with the entrance and exit of a catwalk. Ideapark (n.d.) is a shopping mall where a FogScreen has been deployed to advertise the shops in the vicinity to potential costumers entering the shopping mall. One location that will be referred to is the permanent integration of a FogScreen at the Discovery Place, Charlotte, North Carolina, USA. As a hands-on educational science centre, Discovery Place has an exhibition named "Sound Space". The exhibition used a sensory system to create music through the movement of the participants present in the space, breaking beams of light would result in the sound of an instrument being heard, resulting in the creation of music. The FogScreen is installed at the entrance to the space, allowing the participants to walk through the smoke when entering this particular interactive exhibition. (Discover Place, n.d.)

To obtain a clearer understanding as to how the FogScreen impacted on this space (engaging the audience both physically and visually at the Discover Place), a number of

people were interviewed who visited this particular venue where the FogScreen is permanently installed: *'[...] you could wave your arms or blow into it and the picture of the cogs would be momentarily smashed, but very quickly the smoke coming out of the machine would replace it, and the image of the cogs would return.'* (Personal communication by Interview 5 Feb 2012) This extract illustrates that the participants within the exhibition were able to engage at a physical level through the interaction created with the fog. Also, through this physical interaction with the fog, the audience's presence within the space could potentially cause an alteration to how the image is perceived. I took from one of the interviews: *'[...] just standing in the smoke made you feel as though you were somehow a part of piece'*. [sic]. This extract can be interpreted to indicate that the audience's experience alters as they proceed through the exhibition; through the interaction of the FogScreen an alteration of their role as passive viewer to interactive occurs, as they becoming a part of the environment around them, creating change to what is being potentially created then viewed.

At Plasa 2012, I carried out an interview with Andrew Hesketh, the manager of FogScreen UK (Personal communication by Interview 12 Sep 2012). In doing so Mr Hesketh demonstrated a FogScreen unit in operation, with both still and moving footage being projected onto a wall of cold mist, produced by the FogScreen. During the interview I was able to get confirmation regarding particular specifications, such as; the maximum height of the projection screen on all the units is only around two metres, after which the mist begins to disperse making the projected footage unclear to the viewer. It became apparent that the short height restriction could potentially limit its functionality, however, as I referred to previously, there is a model of FogScreen unit that has the ability to connect to more of the same model, to create a wider width allowing for wider projection screen coverage.

Having viewed a number of static and moving pieces of footage on the FogScreen I asked Mr Hesketh if the image quality being viewed was as clear as it could be; he said it was, and having walked back from the screen the footage became in a sense clearer. This could be expected as most things are not quite in focus when viewed at close proximity. When moving further away from the screen to fully appreciate the effect the mist had on the projected

content, the effect of the image in terms of the movement of the mist was very compelling to watch. Even static images appeared to be moving in the mist. Nonetheless, to really appreciate the FogScreen for what it was is not achievable by simply watching it from a distance, but rather the ability to get up close and personal with the mist as well as physically interact with the projected content displayed on the mist. The power is given to the audience; the means to touch the mist, disrupting the flow of mist, thereby preventing and disrupting the creation of the image has the potential to be highly mesmerising and powerful. As discussed earlier, Auslander (1999:55) refers to a '*sensory experience*'; this could be interpreted to represent a mesmerising effect on an audience. The utilisation of technology (in this circumstance a kinetic projection screen) in close proximity to an audience within a live performance setting, allows the audience to physically engage with the technology. This creates an opportunity for the engagement of all the senses: Visual, Olfactory, Tactile, Somatic, Kinaesthetic and Auditory (if present).

Water Projection Viewing

Projection onto water appears to be the most dominant way by which projections are presently viewed when using a kinetic screen. As discussed by Dixon (2007) in *Digital Performance*, Paul Sermon and Andrea Zapp utilised a technique originally employed in 1922, in Karel Capek's R.U.R (*Rossum's Universal Robots*) to create projection onto a screen consisting of sprayed water, with technical support and from Vier-Fahrt, for the installation of *A Body of Water* (Sermon & Zapp, n.d.). This particular installation utilised a projection viewing screen by producing a wall of water through dispersing high-powered water, forming a water mist screen. Through the means of live camera feeds, content was filmed at two different locations. It was then simultaneously mixed together using chromakey, before being projected onto one side of the water screen. This alteration gave the impression, once it was projected onto the water screen, that the visitors were scrubbing one another in the shower. Once visible on the water the content was re-filmed and fed back to the other two locations to be viewed again in its entirety on TV screens, thereby allowing audience participation. This film being captured live and mixed was a representation of the present day, whereas on the opposing side of the water screen the audience could view the projection of a documentary of

the miners showering when the shower room was still in operation, where they scrubbed each other, which was fitting in respect to what the installation was in reference to (MediaArtTube, 2009). Presently we are able to see this process being applied within the arts in various ways. We can find water screens being utilised around the globe, playing an important role in the performance by altering the way in which the audience are accustomed to viewing a projection. This gives the performance a whole new level of engagement for the audience to be engrossed in.

At Disneyland's performance, *Fantasmic*, located in Disney's Hollywood Studios theme park, USA, we can find projection onto water playing a vital role within this particular performance. Located by a small lake in the theme park, the audience seating is on opposite sides of the lake to that of the stage, from which Mickey Mouse and other characters from Disney deliver their performance with boats sailing past the audience. Throughout the performance Mickey creates magical images and footage from a number of Disney classics such as *The Little Mermaid*, *Aladdin* and *The Lion King*. By using water from the lake a giant water screen is created, produced from masses of water droplets pushed up into the air with great power. (UndercoverTourist, 2011)

Interviews with audience members from *Fantasmic* were carried out and key points were made clear, to assist in providing an understanding for the benefits of using a water screen opposed to a static screen. During an interview with one particular audience member they identified that the movement of the water, in conjunction with that of the footage being projected, created a 'novel, *exciting and memorable effect*' (Personal communication by Interview 30 January 2012). Had the footage been projected onto a static screen we can confidently assume that these particular effects would not have been experienced. As far as the water screens are concerned, the novelty in viewing projections adds considerable weight to the 'advantage' side of debate. During *Fantasmic* there certainly was not the chance for the audience to physically interact with the water screen. We can, though, still find audience members recalling their exposure to this technique as '*exciting and memorable*'. It is safe to say that due to the physical interaction not being present, these emotional responses can

subsequently be produced through the visual engagement between audience and water screen.

One of the leading water screen providers in the UK is Aquabatics (n.d.). The water screen Aquabatics use is best described as a long water curtain similar to the one that will be discussed later in the section titled *Practical Development*. In the past the Aquabatics water screen has been implemented for a variety of events such as promotional, stage backdrops and as a means to view presentations. Having made contact with Aquabatics an interview was granted with Martin Allen, the team leader at Aquabatics and, when interviewing Mr Allen, it became apparent that the reason for people wanting to hire and use the water screen was not for the image quality but rather the novelty appeal. It is undeniable that projection onto a static screen provides the audience with a clearer image, but when taking into consideration the other factors that are created as a result of using a kinetic screen, we are able to see the appeal. During the interview with Mr Allen it was clear that the novelty appeal had a major part to play in the demand for the water screen by Aquabatics. The customers are not interested in the water screen simply for its ability to display the content, but rather to give the audience something 'novel, *exciting and memorable*' from the falling water, and in doing so the audience are more likely to retain concentration.

Sand Projection Viewing

In 2004 Japanese H.O Group produced *Perfect time* (2004), an installation that relied upon its audience to be fully present. Without the audience interacting with the fixtures, images would not be seen, due to the fact that the projection surface on which the audience viewed the content was flowing sand. The device would be fed sand by the audience and having done so, the sand would flow out of the bottom allowing the images to become visible. (H.O, n.d)

Perfect Time (2004) was an intriguing installation as without the participation of the audience the installation would not be fully visible to an audience, other than the physical units that dispense the sand. Once the units had been fed with sand, which subsequently flowed out of the units, the audience could then physically touch the sand that the projected footage

became visible on. In many ways the physical interaction between the sand and smoke (as discussed earlier) could be interpreted as being very similar, except that the sand could arguably be considered as more physical; this is because the sensation of touching sand is considerably more physically aesthetic than when touching smoke. You can of course, much as with smoke, alter the look of the image through interrupting the flow when projecting onto sand; this will be addressed in more detail as to what was learnt about the physical interaction properties of projection onto sand later in the Practical Development section.

During an interview with the H.O. Group's Artistic Director, Hide Ogawa I asked; 'Do you think that the audience watching the projection in "*Perfect Time*" were more engaged because of the effect that the moving sand had on the image?' Mr Ogawa replied:

Yes, it has effects by the unique falling sand metaphor. The audience seems enjoying the combination between projection contents and falling sand. [...] I always create the motion graphics by using feature of this falling sand metaphor. For instance, falling contents such as snowing and water are very fitting to the context. And also the opposite effects like growing and fireworks were really effective. This means how to use the gravity (vertical metaphor) in the story is very interesting point. [...] However, I think it's not just a matter of material effect of sand. Rather, it is based on the unique interaction story. I think that audiences are always engaged in the process of the Perfect Time. [Sic]

(Hide Ogawa, Personal communication by email, 2 March 2012)

Through Hide Ogawa's personal experience of this genre of projection viewing within *Perfect Time* (2004) and that of this continuing examination, I can begin to see a correlation between these different expert views concerning the uniqueness of viewing projection on sand, in addition to views expressed in other interviews and by Mr Allen. This could be interpreted as a reference towards a novelty element, such as the viewing of smoke and water projection.

Mr Ogawa's response to the question previously mentioned brought attention to the importance of the content being projected. Ogawa talked about the surface of the kinetic screen influencing the audience's visual engagement, and we must continue to keep the importance of the screen at the front of our minds. We can ask the question; 'Does the content of what is projected have an underlining influence on how we engage with the kinetic screen?' It is apparent from Hide Ogawa's responses, that the falling momentum of the sand

can be utilised to our advantage. By projecting content such as snow on the movement of the kinetic screens resource, in this instance sand, the combination of both the resource and content's movement, was an attempt to highlight the movement which engaged the audience's attention.

Having made reference to the effect of moving images across the kinetic sand screen, this raises the question about footage, which does not move across the screen. Is the visual engagement enhanced for the audience viewing the content or are we able to say that kinetic screens only enhance the visual engagement when the content is moving across the screen, either with, or against, the flow of sand, water or smoke? Using image content with a particular movement in cohesion with the falling sand, it can be assumed that the audience were increasingly drawn and fixated; this is a process that can be found evident in the visual engagement test shown in *figure seven*. With this combination of the two working in conjunction with one another, I can control what the audience is drawn to. This can be explained through a study carried out by Nick Moran at the Central School of Speech and Drama titled '*Resisting the Lure of the Screen*' (Moran, 2010). As part of the study a number of performances were created with the use of projection, all with the aim of developing an understanding as to what elements of the projections draw the audience's attention away from the physical performers on the stage. Having carried out their examination on the effect of projection, through the delivery of a number of performances, they found that moving images would draw the attention of the audience away from the physical performer to that of the screen. In respect to a kinetic screen this raises the question as to, 'whether the constant momentum of the moving resource engages with the audience continuously regardless of whether or not a static image is being used.' The following extract supports this theory of visual redirection:

Attention may be directed voluntarily in response to instructions or cues. However, attention may also be captured by environmental events. In particular, the occurrence of visual change in the periphery has the effect of summoning attention to its location.

(Jenkin & Harris 2001:84)

We can see here, as stated by Jenkin & Harris (2001), that through an alteration in our peripheral vision we, automatically and without any warning, alter our perception to fix on the

new given point and with the falling sand of a kinetic screen the hold on the audience is renewed. This is something that many people can relate to from past experience. For example, whilst sat in a presentation an error suddenly appears on the PowerPoint, instantly drawing your attention away from the speaker, who more often than not is located to one side due to the change in your peripheral vision where the screen is located: Could this attention re-direction happen anyway without the use of animated projections? The extract by Jenkin & Harris (2001) supports the theory that projection onto a kinetic screen can enhance the audience engagement due to the constant renewal of the image and the constant movement of the kinetic screen; the audience is constantly re-engaged by the falling momentum as opposed to a static screen.

Practical Development

Overview

In this part of the thesis I will discuss the research that has been obtained through practical examination and development, which formed the majority of my practice as research. When I refer to the development, I am talking about the installation/demonstration that took place at the end of the research to present the findings, which will be called upon later in the thesis.

Throughout the ever developing journey of the practical research that took place within the workshop, I understood that the last stage would be to present the findings in a practical manner. Through this understanding, I needed to develop a demonstration that would provide a platform in which a number of kinetic screens could be seen functioning.

Understandably, to know early on as to what the exact aesthetics and general ambience of the demonstration would be was simply not possible. It was something that would slowly come to light as the practical experimentation progressed, using all the research and content that had already been collected and continued to be acquired.

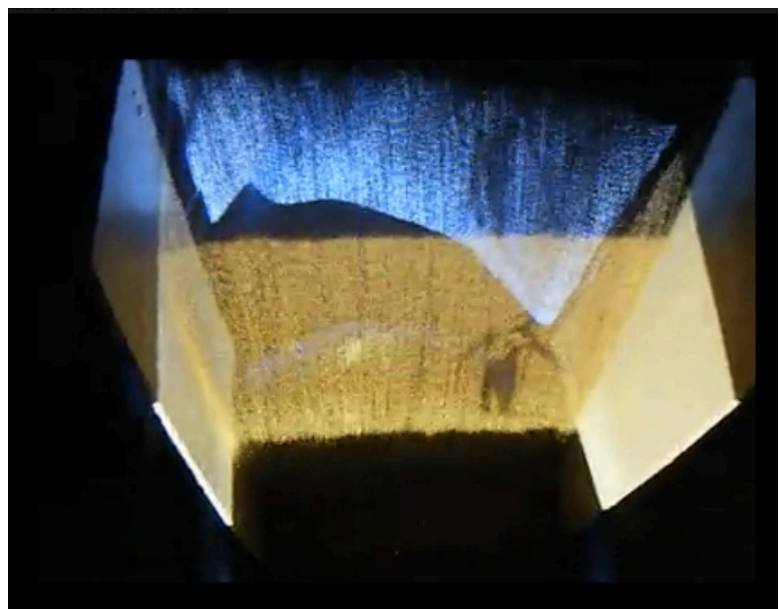
Once enough research had been compiled and a clearer understanding of how the research, both practical and theoretical, could be integrated with one another, preparation for the

demonstration of the research could begin to take shape; the name assigned to the demonstration was “Reverie”, which means to dream. This was the starting point for the development of the installation/demonstration environment’s aesthetics, as well as the inspiration for the projected content that was used on the kinetic screens positioned around the space.

The First Stage

Having previously incorporated the viewing of projected footage through a layer of water in an installation titled, *Never Forget Me* (2011), the idea to further this work was what generated the notion of projection viewing through the application of a kinetic screen. Having had this idea the question was developed: ‘Would footage if projected onto sand be clear enough to view and what would be the effect on the image and the way in which it could be watched?’ As a result of this spontaneous idea I began experimentation, which concluded in the creation of what can be best described as a giant wedge shaped hopper with flaps either side from where the sand was dispensed.

Figure one on the right shows the earlier sand screen; you are able to see the unit dispensing sand. When first experimenting with this the only type of sand that was available was Sharps Builders sand, which is a much thicker, gravely sand, unlike a fine children's play sand that was later used for *Reverie* (2012); the reason



(Figure One: Footage visible on first sand unit when using Sharp sand)

for this alteration was purely artistic choice. It was during this first test when it became apparent that it was possible to view images through the application of rear projection onto

sand.

Having undergone initial experimentation in viewing projected content on sand, I also carried out a number of tests within the workshop into the application of viewing projected content onto/through water; in this circumstance a number of glass bottles containing water were used: The aim of this was to develop first-hand experience into the effect that water had on the image. During this examination different methods of diffusing the image were experimented with, in an attempt to make the footage on/through the bottles become more visible to the observer. A variety of techniques were implemented such as spraying the outside of the bottles with a frost spray and mixing a number of substances: flour, syrup, gelatin and others into the water to produce an alteration in water density, as seen in *figure two* below. Through adding these substances to the water, the bottles became in a sense easier to observe, due to the light being diffused; this made the footage in the water hard to fully perceive. The best result from this examination came from the application of a frost spray, on the back half of the bottles. When projecting content onto these frosted bottles the image was diffused, preventing any intense light from blinding the viewer when watching the content shown on the bottles, but still allowing the image to clearly pass through the frosted glass and water, creating a captivating effect.



(Figure Two: Glass bottles. Some of which are frosted and other with varying concentrations of diffused water.)

Sand

Having carried out the original test to view projected content on a wall of sand, the next stage was to carry out research into its application elsewhere in the world today; the company previously discussed earlier in this thesis, H.O. Group (n.d.) is of interest. After engaging in personal correspondence with the company and viewing various videos/images, it was possible to get a clearer conceptualisation as to how the construction of a kinetic sand screen would be designed and constructed to view projected footage.

By beginning the practical examination I also carried out a number of tests, having constructed a sand-dispensing unit very much like the one previously designed and constructed, the aim of this unit was not for the application in *Reverie* (2012), but rather for the ability to practically observe, evaluate and then apply the relevant results for further development. When carrying out the tests with the second unit, experiments with two different sands were examined. Whereas in *Perfect Time* (2004) a fine glass sand was used, this examination began with testing Sharps sand, as described earlier, the second being children's play sand. Also carried out were a number of tests, altering the size of the gap through which the sand was dispensed, which in turn altered the flow of sand and thickness of the screen. It must be acknowledged that during these tests the content was rear projected onto the sand and therefore, the thickness of the wall of sand as it fell was of significant importance in respect of the ability to view the footage through the sand.

When examining the study, I developed a stronger understanding as to how a kinetic screen's engagement can potentially create a higher level of physical interactivity, more so than with a static screen. Through the means of touch the initial content already perceived by the viewer is metamorphosed, giving an alternative representation with which the viewer can engage. The alteration to the content that I refer to is the enhancement of visual depth, through the physical interaction of the kinetic screen surface, in this case sand. The viewer displaces the sand resulting in more depth to the curtain of sand, therefor in essence the content appears to have a 3D appearance. The concept of the audience not only acting as the viewer, but also participating as an influential role in what is to be perceived through the means of

physical interaction, was the concept that would be the foundations for what would make up *Reverie* (2012).

After reading the conceptualisation for *Perfect Time* (2004), the concept of the audience having to feed the unit sand so that they could in turn view the content being projected, was an important element to create physical engagement. Whereas in *Perfect Time* (2004), the audience would not see any content until physical interaction had been made by the audience through adding sand to the units, in *Reverie* (2012) this was not the case. The final unit, *figure three*, as shown on the right, was designed and then built so that it was pre-set with enough sand to allow the viewer approximately 1 minute 30 seconds to view the content.



(Figure three: Sand projection viewing Unit used in *Reverie*, 2012)

The initial stage of the screen's engagement was initiated to take place by the audience pushing the blue illuminated button on the side of the unit, releasing the sand to display the content. Once the sand had completely depleted, the audience were then encouraged to participate in a second stage of physical engagement through the means of feeding the sand screen unit with more sand, allowing the images to reappear. Throughout this process of viewing the content on the sand in the first and second stages of engagement, viewers of a more adventurous nature were drawn into the momentum of the sand and the way in which it manifested the projected content. With this lure the viewer would then touch the falling sand,

altering the way in which the images were perceived and in doing so construct a third stage of engagement, which was previously referred to as a higher level of physical interactivity.

Water

Having carried out the test as described earlier in this section, referring to projecting through bottles of water with a variety of density, the process moved away from this technique towards one that involved projection through/onto a kinetic screen of water. After some research and examinations of current methods of viewing images on water, I altered the direction of the experiments, having come to the decision not to go down the route that involved sprayed water. The main reason for this decision was due to the environmental restrictions; the space planned to present the demonstration was within a studio and due to the unpredictable spray of water created through this technique, an alternative approach would need to be considered.

I made the decision to begin creating a screen similar to that which we find Aquabatics (n.d.) using for presentations and other events, except this one would be designed to create a complete curtain of water, as opposed to a long rain curtain; a complete curtain refers to a sheet of water with no voids or space, unlike the rain curtain that uses individual streams of water. Before long it became apparent after conducting various tests in the workshop, including experimenting with the flow of water, the size of the screen and altering the gap which determined the thickness of the water sheet, that a complete curtain of water was not the best direction to head in. The reason for this was fundamentally due to the lack of equipment available that I required, in particular a water pump that had the ability to circulate a large enough quantity of water at speed as needed. It was now apparent that the type of water screen that would need to be developed and created would be that of the rain curtain similar to the one used by Aquabatics (n.d.). With this in mind I began developing a water screen that utilised this rain-like effect and having experimented with a range of techniques, the best result came from the use of a PVC tube.

Through the development of a number of important variables, it became apparent what would

assist in the creation of a rain curtain water screen. These variables were:

- The holes drilled into the PVC tube from which the water exited from worked best when drilled with a size 4 drill bit.
- The size of the gap between each hole worked in conjunction with the hole size. Altering one or the other would affect the discharge of water and when closer together the water would merge, creating a big discharge in one location, creating gaps elsewhere on the screen; however, when the holes are positioned too far apart gaps in the screen are visible, and therefore when using a size 4 drill bit it is advisable to have a 1cm space between each of the holes.
- As seen in *figure four* below, there are two lines of holes parallel to each other to ensure no gaps in the screen; the distance between these two lines is also 1cm.



(Figure four: PVC tube used to dispense the water for Reverie, 2012)

- To allow the water curtain to have an equal spread of water across the stretch of the tube, the length of the tube must work in cohesion with the power of the pump that is being used.

Once I had developed these variables and applied them through trial and error, the water screen was at a point in its development where it could undergo the final stage of construction. This would be the unit later installed and then used within the demonstration; *figure five* below shows an image on the water screen used in *Reverie* (2012).



(Figure five: Image of water screen in *Reverie*, 2012)

Smoke

As discussed earlier in this thesis, FogScreen company (n.d.) use a cold mist to create the surface that is then in turn projected on to. This method is not easily accessible with everyday materials, which is why I needed to develop and examine a different method for the demonstration. It was apparent from early on that the everyday water based smoke used in most live events venues would be an easily accessible form of smoke to run experiments on, the aim of which was to gain a stronger understanding as to what the best way of viewing projected content on smoke would be.

The first stage of the development was to experiment with the density of the smoke, projecting footage through smoke at different stages as it dispersed into the air. Having carried out a number of experiments in a studio, with a projector and smoke machine, it was clear that the smoke had to be of a particular density to allow the content to be clearly visible. The density of the smoke could not be too dense nor too dispersed but in-between the two; it even became apparent that more depth was given to the footage than if it were to be projected on a static screen, in essence, giving it a three dimensional aspect.

Having carried out the initial test I made the decision that when it came to the installation a method would need to be developed to control the smoke, in many ways similar to how the FogScreen (n.d.) company use two curtains of air either side of the smoke to keep it on track. The unit I constructed was similar to a long triangular wedge. This design allowed the air and smoke that was constantly supplied into the unit a natural point to flow out of the unit, forming the smoke surface on which the projected content would then be viewed on. Once the first unit had been created, it was suspended from a rig. I carried out tests to chill the smoke so that it would just fall to the ground and also the use of a haze machine was implemented, because of its function to blow the haze. Neither of these had the desired effect due to there being a problem with the smoke; when leaving the unit the smoke would float down making the footage being projected visible, but though smoke had originally drifted down, in time it slowly began to drift upwards, making it much denser, which as discussed earlier made it difficult to view the content being projected.

After carrying out the test with chilling the smoke and using the blown air from the haze machine, I conceived concept; why try to cool or blow the smoke down, when it naturally rises? I then turned the unit the other way up so that the smoke machine would inject smoke into a tube which was then funnelled up into the unit before exiting, forming the wall of smoke on which projected content was visible. I fitted two small fans to the unit to give the smoke more lift as it exited the unit into the air; this did, however, have an adverse effect on the screen. When the fans were on, the image was not quite as clear to the viewer, but when they were turned off, the image was much clearer. When the fans were off this made it less

functional for a viewer to go up and physically engage with the unit and to interact with the images on the smoke, as the movement of a person would disrupt the airflow around the unit, making the footage unclear to the observer for some time. For the final installation/demonstration the unit, as seen in *figure six* below, had the fans turned on to enable the audience viewing the kinetic smoke screen the chance to visually, as well as physically, engage with this projection viewing technique.



(Figure Six: Smoke Projection in *Reverie*, 2012)

Reverie

Having created all the kinetic projection screens, I installed them into the installation/demonstration as referred to earlier, titled *Reverie* (2012). Though this is referred to as an installation/demonstration, it was intended to demonstrate three main kinetic screens operating. The general aesthetics and content shown on the screens derived from the meaning of 'Reverie': 'to dream or deep thought.' It was this definition that produced the artistic outcome of the space, a blend of styles that came about through experimentation. For example, the smoke screen was housed within an old crate, whereas the water projection was in its own partitioned space; the water fell 4 metres into an old rock pool, or as some audience members referred to it, a well. I designed the space in a manner that encompassed

an even, united theme; 'Reverie', a dream like state: without the constraint of a unified aesthetic throughout, each projection screen environment had an aesthetic personae of its own. The content being projected on each of the screens was different footage for each of the screens, dependent on what worked well in cohesion with the resource in question. During the demonstration the audience were given the freedom to walk around the environment as they wished, interacting with the kinetic screens should they so wish to do so; they could also read a brief piece of information regarding each of the screens.

Displayed on the sand screen was the image of a girl walking through a forest, chosen for this screen because of the depth that the sand gave the image of the forest, which was even more so when the audience physically engaged with it. The water screen on the other hand was not as clear to the viewer, so the footage present on this screen was of faces talking about dreams that they had experienced. The smoke screen had a combination of three footage sequences, all having their own effect on how they were viewed on the rising smoke; the footage of dancers on the smoke allowed the audience to perceive what appeared to be greater depth to the footage, due to moments when their arms would appear to come out of the screen towards the audience. It was hoped that the audience would feel a greater temptation to engage physically. The snow falling down the wall of rising smoke worked well as the viewer was constantly engaged, due to the continuing vital renewal created from the kinetic screen as discussed earlier. The last piece of footage for this screen was a log fire; the decision for this piece of footage was very much a more playful context due to the association between fire and smoke. There was in fact a fourth & fifth screen, one of which was projection onto a static plastic mould of a face; the decision not to discuss this in the thesis was simply because it is not a kinetic screen and therefore not relevant. The last screen, however, was a static screen that had all the footage from all the screens present on it. The idea behind this was to allow the audience in the space to see the effect that projecting onto the resources, water, sand and smoke, had on the viewing of the content, as well as gaining an understanding for the physical interaction that can take place with the Kinetic screen.

Engagement

As additional research to support my main body of work

Overview

Vision, in the sense of spectating, is one of the key components needed for creating a relationship between audience and a performance, but not necessarily a crucial requirement for anyone wanting to fully engage with a performance. This is due to our other senses that make up what is known as Intermediality. Intermediality is the void created in-between the cohesion of the elements; image, space, sound, time, word and body, that in turn manifest the performance, performer, audience and media (Chapple & Kattenbelt, 2006:24).

This section of the thesis will be opening the foundations for further research to be carried out into the alteration of engagement, both visual and physical, between a static and kinetic projection screen. Therefore this section will take the initial step of examining a number of forms of engagement that could be found to have an effect on the way in which a kinetic, opposed to a static screen, could potentially alter the engagement within a performance environment.

Engagement Test

I carried out a small engagement test so that initial data could be captured in order to build the foundation to show whether or not there was a difference in the duration of the visual engagement between the static and kinetic screen. During the examination the following factors were carried out to ensure a similar test environment.

The factors of the test:

- The footage shown was the same piece lasting 30 seconds but looped, always starting from the beginning.
- The audiences were seated approximately at the same distance from the screen.
- The screen size on which the footage was being viewed was similar in size.
- None of the participants knew what was happening until they were in the space.
- No participant took part in more than one test.

Earlier in this thesis I proposed the theory of there being a more *interactive* and *physical* engagement when being exposed to a kinetic screen, was proposed. However, as stated in the factors of the test above, during the examination the participants remained seated throughout which in turn meant that the results from the examination would reflect solely the visual engagement aspects.

Type of Screen	Static	Kenetic
Time	0:01:37	0:01:15
	0:01:05	0:05:55
	0:04:30	0:05:31
	0:00:44	0:17:09
	0:00:53	0:02:44
	0:04:11	0:04:30
	0:01:20	0:01:34
	0:02:20	0:01:45
	0:00:42	0:01:13
	0:02:22	0:01:15
Average (mean) Time	0:01:58	0:04:17

(Figure Seven: Engagement test results)

Figure seven above, shows the results from the examination. As can be seen from the average time for each of the screens, the visual engagement duration was considerably longer with the kinetic screen than that of the static one. When we look at the longest engagement time, we can see that the kinetic screen at 00:17:09 had a significantly prolonged visual engagement when compared to 00:04:30 by the static screen. These results, though not of any substantial size, do begin to show a slight alteration in duration of an audience's vital engagement of the content; furthermore, there is now a starting point for additional study to be undertaken into the comparison of duration between static and kinetic screens.

Conclusion

Throughout this thesis the application of both theoretical theories, as well as practical examination, have been undertaken with the aim to provide a substantial amount of material to lay the foundations for a stronger understanding and interpretation, so that the question set out at the start of this thesis could be answered: 'Can the use of a Kinetic Screen within my work be utilised as a medium that enables the audience to view projected content?'

When referring to visual engagement we can see initial evidence that indicates a variation between the audiences viewing a kinetic screen, opposed to a static screen. As shown in *figure seven* from the engagement examination, there was a prolonged average visual engagement time of 0:04:17 with the Kinetic screen compared to that of the static screen at 0:01:58. Whereas this is not a sufficient amount of data to confirm this prolonged enhanced engagement indefinitely, the foundations are present. Furthermore having carried out interviews with leading companies/ practitioners currently utilising this projection viewing technique, as well as those who have come into contact with a kinetic screen, the outcome is of the following conclusion: when projected content is delivered to an audience/viewer through the application of a kinetic opposed to a static screen, there is enough evidence to indicate an enhancement of engagement, when either of the two factors are present.

The first of these factors when referring to an enhancement of *visual* engagement is down to an artistic or what is referred to as a *novelty*, appeal. As we saw from what Hide Ogaw said earlier, in the thesis, in reference to audience members who went to see *Perfect Time* (2004): '[...] *It has effects by the unique falling sand metaphor. The audience seems enjoying the combination between projection contents and falling sand*' [Sic]. It is clear from Hide Ogaw's personal reflection of this use of sand projection in *Perfect Time* (2004) that he recalls the enjoyment by the audience as they see the sand being used. We could, however, interpret this response by the audience as being largely a novelty appeal for those who have not previously come into contact with this type of projection viewing. As said by Martin Allen: '*A number of clients have booked it for its uniqueness*'. Where he uses the word '*uniqueness*', we could interpret this to represent what the word *novelty* stands for. Having discussed the

research throughout this thesis with regards to the technique of viewing footage on water, the conclusion derived from the results from the research are that water projection is not an effective way of viewing footage in a particularly clear way. So it is highly probable that someone hiring one of Martin Allen's water screens would not be looking purely for a presentation delivery platform, but the *novelty* appeal that comes with its use or through making a particular aesthetic decision based on need.

Repeatedly this thesis has re-visited the theory that through the use of a Kinetic screen the audience is engaged for a longer period of time. This is due to the kinetic movement of the resource whether it is water, sand, smoke or another resource as they fall or rise and it is aesthetically pleasing to watch. The motion of the sand on the footage, whether it is a still shot or film, gives the content more layers of movement. Jenkin & Harris' (2001:84) statement, examined earlier, supports the theory: through the ongoing movement of a kinetic screen, as the resource falls or rises, it captures the audience viewing. Due to this movement of the resources that make up the kinetic screen, there can be found a constant audience re-engagement in what they are viewing, whereby attention is constantly summoned to the respected location. This visual fix can also be found on the kinetic screen being present in *figure seven*, where we can clearly see a prolonged visual engagement with the kinetic screen opposed to the static screen.

The *physical* engagement is a strong attribute to the delivery of a kinetic screen's engagement, undoubtedly, through the deployment of a kinetic screen within a close proximity performance, like that which is achieved within a piece of installation theatre performance. This is something that can reflect back to the early development and experimentation of the magic lantern and watchman lamp, where the audiences were initially, until its larger use within performances such as *Phantasmagoria*, used within close proximity of the viewer. Through the means of physical engagement, as heard from audiences who had been exposed to a FogScreen (n.d.), the ability, should they wish to influence or even effect what it is they are viewing, was achievable, a factor that is not achievable with the static screen. As Auslander discussed, neither a mediatized performance nor live performance

have a variation in sensory experience and are both alike in terms of 'olfactory, *tactile*, *somatic*, and *kinesthetic*' (Auslander, 1999:55). This is likely to be the case when watching a piece of performative work on stage with a static screen; nevertheless, if a kinetic screen was to be introduced to an audience in the correct environment, where they could physically interact with it, the engagement between that of the kinetic screen and audience would be of a greater magnitude than that of a static screen; this is because of the ability to physically alter the way the content can be perceived.

The results of the investigation that have been explained throughout this thesis have shown examples of past and current uses of kinetic projection viewing, theories of perception and theatrical engagement. This thesis therefore does demonstrate that a Kinetic screen has the potential to be utilised within a performance, with the best result being implemented in a performance that enables the viewing audience to physically engage with the screen, in environments such as an immersive performance.

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